



Challenges and Issues on Vertical Construction: Basis for Strategic Planning and Project Management

Vincent Michael G. Sauler

Graduate School, Bataan Peninsula State
University, City of Balanga, Bataan,
Philippines
vinmike2497@gmail.com

Michaela T. Espino

Department of Industrial Engineering and
Management, College of Engineering, National
Kaohsiung University of Science and
Technology, Kaohsiung, Taiwan

Grisom P. Gines, PhD

Graduate School, Bataan Peninsula State
University, City of Balanga, Bataan,
Philippines

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Abstract

The rapid development of infrastructure in the Philippines heavily relies on the vertical construction industry, which includes residential, commercial, educational, and government structures – all classified as an occupancy type under the National Building Code. With increasing technology integration and focus on safety and workforce development, understanding operational challenges is vital. The identified key challenges include labor shortages, design alterations, material quality issues, and the implementation of complex engineering specifications. This study, “Challenges and Issues on Vertical Construction: Basis for Strategic Planning and Project Management”, specifically investigates challenges Resident Engineers (RE) faced in vertical construction projects. With this, the research employed qualitative methodologies, utilizing oral interviews to gather in-depth data. The study proposes strategic planning and project management strategies designed to address the identified challenges. By providing actionable insights, the findings aim to improve project management systems for construction companies and inform academic curricula for future engineering managers.

Keywords: Infrastructure, Project Management, Resident Engineers, Strategic Planning, Vertical Construction

Introduction

In the Philippines, vertical construction projects governed by Republic Act (RA) No. 6541, also known as the National Building Code of the Philippines, are crucial in infrastructure projects and are primarily executed by the Department of Public Works and Highways (DPWH). This includes a variety of building types, which are classified as residential, hotels, educational, government, and healthcare structures, and increasingly integrating advanced technologies to boost efficiency, reduce costs, and ensure safety. In addition, the act involves creating spatial relationships between individuals and their environment and requires applying fundamental construction principles. The country is increasing its infrastructure spending, focusing on adopting innovative technologies to improve efficiency, reduce costs, and enhance safety standards while ensuring regulatory compliance. Additionally, investments in workforce training are crucial to meet evolving industry needs. Resident Engineers (REs) oversee these projects but face challenges like labor shortages, poor-quality materials, design changes, and environmental factors.

The publication "Engineering Management: A Comprehensive Review of Challenges, Trends, and Best Practices" (2023) explores engineering management challenges, including large-scale project complexities, technological advancements, and the importance of communication in multidisciplinary teams (Htet et al., 2023). It identifies emerging trends like the integration of new technologies, sustainability, and the need for soft skills. However, it highlights a research gap, particularly regarding the long-term impacts of vertical construction on urban development, empirical evidence on project management approaches, and the practical application of research findings (DiMaculangan, 2023).

With this, a significant research gap exists in the practical application of vertical construction management, particularly concerning urban planning and sustainability. This study aims to address these challenges through qualitative research, utilizing online surveys and oral interviews, in order to identify key issues and to propose better strategic planning and project management solutions for vertical construction in the Philippines. As well as focusing on RE's perspective by relaying engineering management education.

Methods

A. Research Design

This study employed qualitative research to examine strategic planning and project management practices suited for vertical infrastructure projects in the Philippines, such as schools, hospitals, and municipal buildings. Vertical construction is economically significant but lacks the comprehensive planning frameworks seen in horizontal projects by DPWH. The research focused on capturing the real-world challenges faced by resident engineers through in-depth inquiry.

The chosen methods for this qualitative study were narrative and thematic analysis, which were applied to the gathered data through oral (face-to-face) interviews. Oral

interviews were selected due to their effectiveness in systematically gathering extensive data and enabling rapport building to encourage honest and detailed responses. Narrative analysis was used to capture the lived experiences, perspectives, and project timelines of the engineers, exploring their lived experiences. On the other hand, thematic analysis was employed to identify recurring patterns and core themes related to strategic planning and project management (Procore, 2023). This dual approach enabled a comprehensive understanding of the complexities involved in vertical construction, providing depth and nuance to understanding the complexities of the construction environment, including tacit knowledge and informal practices. Inductive coding, a data-driven approach, was used to allow themes to emerge naturally from participants' responses, proving effective in uncovering unanticipated issues and forming meaningful themes based on real-world experiences. The analysis was facilitated using MAXQDA software and with the guidance of Dr. Ronaldo A. Punla, faculty of the Master of Arts in Education (MAED) in Mathematics. The researcher maintained a reflexive stance to ensure objectivity and reliability. By integrating narrative insights with contextual data, the study offered a robust foundation for improving strategic planning, design management, and policy formulation in vertical construction, providing practical guidance for engineers and decision-makers in the field.

B. Data Collection Tools

The primary research tool employed for this study is an oral (face-to-face) interview, selected for its effectiveness in systematically gathering extensive data. This method was chosen for its user-friendliness and ability to facilitate rapport-building, encouraging respondents to provide honest and detailed descriptions of their experiences. The questionnaire used for the interview was designed to capture in-depth qualitative insights from the respondents.

The interview protocol begins with introductory questions to establish the respondent's experience, build rapport, and encourage further contribution. Main questions focus on personal experiences and expertise, aligning with the literature review to validate findings and identify gaps. The ethical and technical aspects of the research questionnaires were assessed under the guidance of Dr. Jesselyn C. Mortejo, Quality Assurance (QA) Director of BPSU Graduate School, and Dr. Ronaldo A. Punla, faculty of the Master of Arts in Education (MAED) in Mathematics. Building rapport was considered key to obtaining honest answers, achieved through demonstrating genuine interest, respect, and ensuring confidentiality. Relating questions to the literature demonstrates the interviewer's knowledge and appreciation for the respondent's input.

The protocol was designed to understand strategic planning and project management in vertical construction, informed by personal experiences and academic research, and to identify effective strategies and future trends. Below is the interview questionnaire aligned with the study:

1. Name frequent obstacles and issues encountered during vertical construction projects. Please give a brief explanation of these experiences.

2. Considering the factors outlined in the preliminary model regarding challenges in vertical construction and referencing related literature and studies, which of these challenges and issues resonate with your experiences?

3. Can you describe a scenario where your workplace's current strategic planning and project management techniques significantly altered the outcome of a vertical construction project?

4. What supplementary actions/measures did you initiate to address these issues and challenges influencing vertical construction? Which of the strategies you have adopted has been the most successful in overcoming the challenges associated with vertical construction? Please provide a brief explanation of their effectiveness.

5. Given the main aspects in our original model that affect vertical building (economic, environmental, regulatory/political, project management/communication, and workforce), please briefly summarize your proposed solutions.

6. Kindly identify three (3) strategic planning and project management methods or approaches that, drawing from your expertise and knowledge, you would recommend to enhance and advance the vertical construction in the Philippines. Please briefly elaborate on these suggestions.

7. Based on your personal view, how do you measure the success of strategic planning in mitigating the challenges of vertical construction?

8. Have you worked with individuals or stakeholders to address the challenges and issues of vertical construction? If so, do you know who these collaborators were?

9. What future trends do you foresee in vertical construction that could influence strategic planning and project management?

The interview questions tackled frequent obstacles and issues encountered, how the challenges outlined in the preliminary model and literature resonated with experiences, describing scenarios where strategic planning and project management techniques altered project outcomes, supplementary actions taken to address issues, successful strategies adopted, proposed solutions related to various factors (economic, environmental, regulatory/political, project management/communication, and workforce), recommended strategic planning and project management methods, how strategic planning success is measured, experiences working with collaborators, and foreseen future trends in vertical construction. The data were derived from the coded interview responses of eight (8) resident engineers who participated. These interviews were documented with engineers assigned to vertical construction within the DPWH Zambales Second District Engineering Office, which served as the study's research setting.

C. Methods of Analysis

The study employed a qualitative analytical approach using a combination of narrative and thematic analysis to examine the challenges, issues, action measures, and approaches experienced by eight resident engineers engaged in vertical construction projects. This dual approach aimed to provide a comprehensive understanding of the complexities involved in vertical construction, extending beyond surface-level insights.

Narrative analysis was used to document the lived experiences, perspectives, and project timelines of the eight resident engineers. This approach allowed the exploration of individual experiences, perspectives, and provided a contextual understanding of recurring issues such as design flaws, labor shortages, high costs, and communication gaps

While thematic analysis was employed to identify recurring patterns, core themes, and common challenges and strategies related to strategic planning and project management. This technique helped in identifying meaningful patterns and insights from oral interviews, including tacit knowledge and informal practices, providing depth and nuance to understanding the complexities of the construction environment.

The analysis process utilized inductive coding, a data-driven approach where themes were allowed to emerge naturally from participants' responses. This method proved effective in uncovering unanticipated issues and forming meaningful themes based on real-world experiences (Fleetwood, 2023). The data were systematically coded and subjected to thematic categorization, where sub-criteria were identified and grouped to form major themes, which underpin the final models shown in Figures 1 and 2 in the next section.

The analysis was carried out using the MAXQDA software with the guidance of Dr. Ronaldo A. Punla. The researcher maintained a reflexive stance throughout, ensuring objectivity and reliability. By integrating narrative insights with contextual data, the study offered a robust foundation for improving strategic planning, design management, and policy formulation in vertical construction, providing practical guidance for engineers and decision-makers in the field.

Results

This section presents the result from the oral interviews conducted with the eight resident engineers assigned to vertical construction projects under the DPWH Zambales Second District Engineering Office. By utilizing narrative and thematic analysis facilitated by MAXQDA software, key challenges and actionable strategies were identified and synthesized into conceptual model.

A. Challenges and Issues on Vertical Construction

The final model on the elements of challenges and issues on vertical construction is presented in Figure 1. The model is comprised of six core elements—communication issues, project management issues, political intervention/factors, workforce issues, economic issues, and contractor issues—each representing a recurring theme identified through narrative and thematic analysis of the responses from resident engineers. Communication issues surfaced as a critical factor, highlighting breakdowns in coordination among stakeholders, delays in relaying updates, and insufficient documentation practices. Project management issues were associated with poor planning, inefficient resource allocation, and lack of clear timelines and accountability frameworks. Political intervention emerged as a significant external influence, often disrupting project continuity through changes in leadership, shifting priorities, or politically motivated directives. Workforce issues reflected problems such as lack of skilled labor, inconsistent work performance, and high turnover rates that hindered consistent project execution. Economic issues included budget delays, inflationary pressures, and funding uncertainties that adversely impacted procurement and scheduling. Lastly, contractor issues encompassed delays in mobilization, substandard workmanship, and non-compliance with technical specifications.

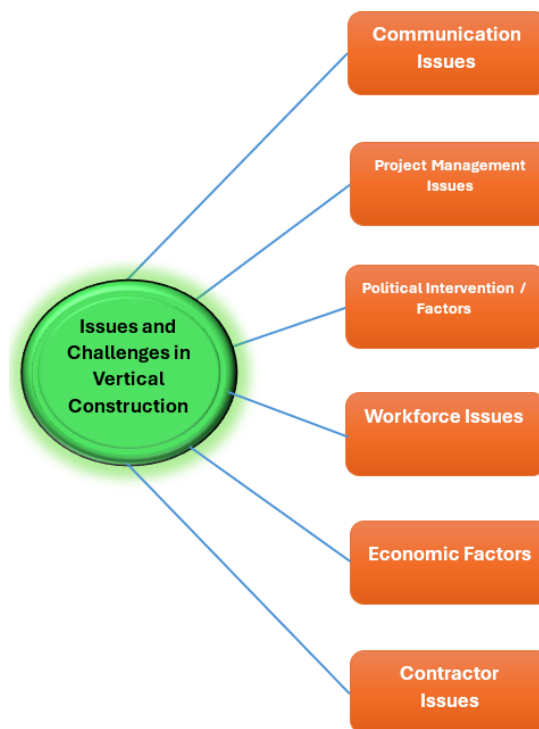


Figure 1

Final Model on The Elements of Challenges and Issues on Vertical Construction

B. Action Measures and Approaches Employed by the Resident Engineers

The final model on the action measures and approaches employed by the resident engineers is illustrated in Figure 2. The model identifies twelve (12) key strategies implemented or proposed by resident engineers to address challenges in vertical construction. These include: risk management excellence, focusing on proactive identification and mitigation of project risks; programs and specifications oversight, ensuring strict compliance with technical standards; and effective manpower management, aimed at optimizing labor allocation and productivity. Communication and documentation were emphasized to enhance coordination and information flow, while strategic planning and goal setting supported structured project execution. Health screening and well-being measures addressed workforce safety and resilience, complemented by flexible scheduling and weather mitigation strategies to adapt to environmental disruptions. Cost analysis and preventive measures focused on financial control and loss prevention, while project performance and site efficiency targeted operational improvements. Additionally, scope identification and detailed estimates ensured clarity in project deliverables, integrated project delivery and feedback management facilitated collaboration among stakeholders, and future innovations and trends encouraged continuous improvement in vertical construction practices.

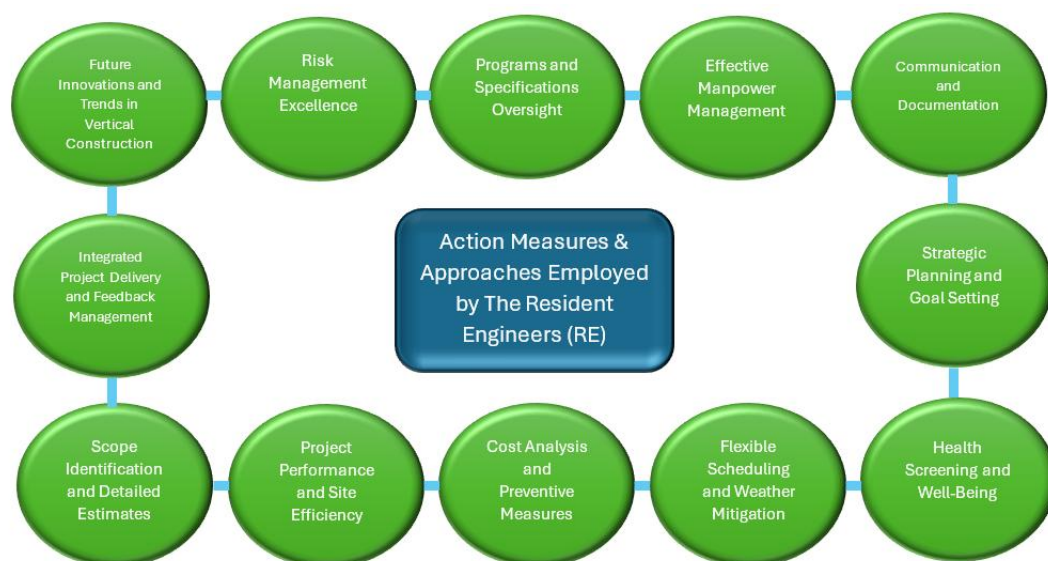


Figure 2

Final Model on the Action Measures and Approaches Employed by the Resident Engineers

C. Result of the Qualitative Analysis Using Narrative and Thematic Analysis with the Aid of MAXQDA Software

The results of the qualitative analysis conducted through narrative and thematic methods is shown in Figure 3. The analysis process ensured that the insights captured from the respondents were accurately translated into structured themes, providing a strong foundation for the development of evidence-based strategies to improve vertical construction project planning and implementation.

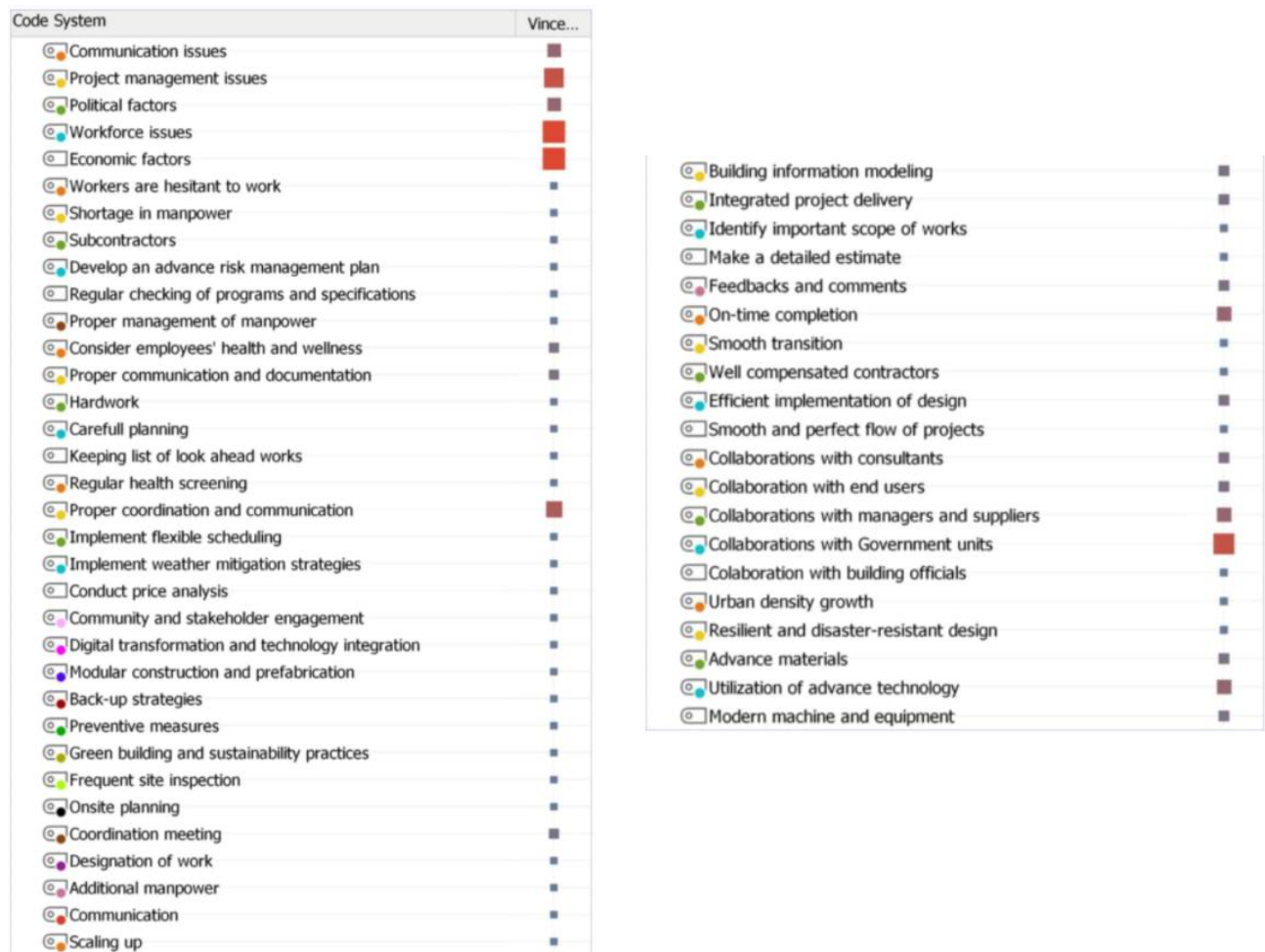


Figure 3

Result of the Qualitative Analysis Using Narrative and Thematic Analysis with the Aid of MAXQDA Software

D. Proposed Strategic Plan and Project Management

Table 1 presents a comprehensive framework that links the identified challenges and issues in vertical construction with corresponding objectives, proposed strategies, strategic planning approaches, and designated focal personnel responsible for implementation. The table systematically addresses six major categories of challenges—communication issues, project management issues, political intervention/factors, workforce issues, economic issues, and contractor issues—and aligns each with specific objectives aimed at resolution. For each issue, tailored strategies are proposed to guide project execution, such as enhancing communication protocols, strengthening project oversight, mitigating political disruptions through stakeholder engagement, improving workforce development, ensuring financial control, and enforcing contractor compliance. These strategies are integrated into a broader strategic plan and project management framework that emphasizes accountability, adaptability, and performance monitoring. Key players, including resident engineers, project managers, technical specialists, and administrative officers, are identified as focal personnel tasked with implementing and overseeing these measures.

Table 1

Challenges and Issues on Vertical Construction, Proposed Objectives and Strategies, Proposed Strategic Plan and Project Management, and Focal Personnel / Key Players

Challenges and Issues on Vertical Construction	Objectives	Proposed Strategies	Strategic Plan and Project Management	Focal Personnel / Key Player/s
Communication Issues	Enhance communication and collaboration among all project stakeholders.	a. Utilize advanced communication tools and platforms, such as project management software and instant messaging apps. b. Establish clear communication	a. Invest in project management software like Asana, Trello, or Microsoft Project. b. Schedule bi-weekly project update meetings with all key stakeholders. c. Create a shared digital repository for all project documents and records. d. Conduct quarterly communication	a. Resident Engineers b. Administrative Unit/HR Department

		protocols and channels.	workshops for project teams.	
		c. Conduct regular stakeholder meetings and updates.		
		d. Develop a centralized documentation system accessible to all stakeholders.		
		e. Provide communication training for project managers and team members.		
Project Management Issues	Improve project management practices to ensure project success.	a. Adopt industry-standard project management methodologies (e.g., PMBOK, Agile, Lean Construction). b. Enhance project planning and scheduling processes. c. Implement robust risk management practices. d. Develop a project performance monitoring and	a. Train resident engineers and teams in Agile and Lean Construction principles. b. Use Gantt charts and critical path method (CPM) for detailed project scheduling. c. Conduct regular risk assessment workshops and update risk registers. d. Establish key performance indicators (KPIs) for project performance monitoring. e. Organize annual training programs and	a. Resident Engineers b. Administrative Unit/HR Department c. Finance Department d. Procurement Department e. Quality Assurance Department f. Maintenance Department

		evaluation framework.	certifications for project managers.	
		e. Provide continuous professional development for resident engineers.		
Political Intervention Issues	Mitigate the impact of political intervention on construction projects.	a. Foster strong relationships with government agencies and officials. b. Advocate for precise and consistent regulatory frameworks. c. Engage in industry lobbying and advocacy efforts. d. Develop contingency plans for potential political disruptions.	a. Establish a dedicated government relations team within the organization. b. Participate in industry associations and advocacy groups. c. Organize regular meetings with government officials and focal individuals to discuss industry challenges. d. Create a comprehensive contingency plan to address potential political risks.	a. Resident Engineers b. Procurement Department
Workforce Issues	Strengthen workforce capabilities and management.	a. Invest in workforce training and development programs. b. Improve worker safety and welfare standards.	a. Partner with technical schools and universities to provide training programs. b. Implement regular safety training and audits on construction sites.	a. Resident Engineers b. Administrative Unit/HR Department c. Finance Department d. Procurement Department

		c. Develop a talent retention and motivation strategy.	c. Offer competitive salaries and benefits to attract and retain skilled workers.	
		d. Promote a positive workplace culture.	d. Foster a culture of respect, diversity, and inclusion within the workforce.	
Economic Factors / Issues	Address economic factors affecting project viability.	a. Conduct thorough financial planning and budgeting. b. Diversify funding sources and financial partnerships. c. Implement cost control measures and value engineering. d. Monitor economic trends and adjust strategies accordingly.	a. Develop detailed project budgets with contingency plans. b. Seek partnerships with financial institutions and investors. c. Regularly review and optimize project costs through value engineering. d. Stay informed about economic indicators and adjust project plans as needed.	a. Resident Engineers b. Finance Department
Contractor Issues	Improve contractor management and relationships.	a. Establish clear contractor selection criteria and processes. b. Foster transparent and fair contractor agreements. c. Implement a robust contractor performance	a. Develop a prequalification process for contractor selection. b. Use standardized contracts with transparent terms and conditions. c. Conduct regular performance reviews	a. Resident Engineers b. Finance Department c. Procurement Department d. Quality Assurance Department e. Maintenance Department

	evaluation system.	and feedback sessions with contractors.
	d. Promote collaboration and Communication with contractors.	d. Organize contractor meetings and workshops to discuss project goals and expectations.

Table 2 outlines a structured response to the key challenges and issues in vertical construction by detailing corresponding strategic plans, implementation timelines, evaluation procedures, and anticipated outcomes. The challenges—communication issues, project management issues, political intervention/factors, workforce issues, economic issues, and contractor issues—are each addressed through targeted project management strategies supported by a phased activity timeline categorized into short-term, medium-term, and long-term interventions. The evaluation procedures include a range of mechanisms such as regular data collection, progress reports and reviews, and stakeholder and community feedback, ensuring continuous monitoring and adaptive management. Potential outcomes of these interventions are quantitatively expressed in terms of project performance gains, notably budget savings ranging from 10% to 15% of the original project cost and reduction in project duration by one to two or more months.

Table 2

Challenges and Issues on Vertical Construction, Proposed Strategic Plan and Project Management, Proposed Activity Timeline, Proposed Evaluation Procedure, and Potential Outcome

Challenges and Issues on Vertical Construction	Strategic Plan and Project Management	Activity Timeline	Evaluation Procedure	Potential Outcome (Based on Php. 5 Million Project Cost and 6 Months / 180 Calendar Days of Vertical Construction)
Communication Issues	a. Invest in project management software like Asana, Trello, or Microsoft Project.	a. Short Term (0-6 Months) b. Medium Term (6-	a. Regular Progress Reports and Reviews b. Stakeholder and Community	These measures will contribute to a notable reduction in project budget costs and timeline,

	b. Schedule bi-weekly project update meetings with all key stakeholders. c. Create a shared digital repository for all project documents and records. d. Conduct quarterly communication workshops for project teams.	18 Months) c. Long Term (18 + Months)	Feedback and Surveys c. Performance Audits and Assessments d. Adjustments to Strategies Based on Monitoring Results e. Issue Tracking and Resolution Logs f. Communication Skills Training and Workshops	estimated at around 10-15% savings in both areas due to improved communication and coordination. This translates to approximately 500,000 to 750,000 pesos in budget savings and will potentially shorten the project duration by about 25 to 40 days.
Project Management Issues	a. Train resident engineers and teams in Agile and Lean Construction principles. b. Use Gantt charts and critical path method (CPM) for detailed project scheduling. c. Conduct regular risk assessment workshops and update risk registers. d. Establish key performance indicators (KPIs) for project	a. Short Term (0-6 Months) b. Medium Term (6-18 Months) c. Long Term (18 + Months)	a. Regular Data Collection b. Stakeholder and community feedback and surveys. c. Lessons Learned Session d. Performance Audit and Assessment	These measures will collectively result in an estimated 10-20% savings in project budget costs and timeline due to improved management practices and reduced inefficiencies. This translates to approximately 500,000 to 1,000,000 pesos in budget savings and will potentially shorten the project duration by about 18 to 36 days.

	performance monitoring. e. Organize annual training programs and certifications for project managers.			
Political Intervention Issues	a. Establish a dedicated government relations team within the organization. b. Participate in industry associations and advocacy groups. c. Organize regular meetings with government officials and focal individuals to discuss industry challenges. d. Create a comprehensive contingency plan to address potential political risks.	a. Short Term (0-6 Months) b. Medium Term (6-18 Months) c. Long Term (18 + Months)	a. Regular Data Collection b. Adjustments to Strategies Based on Monitoring Results c. Issue Tracking and Resolution Logs	These measures will collectively result in an estimated 10-15% savings in project budget costs and timeline due to improved political risk management and proactive engagement. This translates to approximately 500,000 to 750,000 pesos in budget savings and will potentially shorten the project duration by about 18 to 27 days.
Workforce Issues	a. Partner with technical schools and universities to provide training programs. b. Implement regular safety training and audits on	a. Short Term (0-6 Months) b. Medium Term (6-18 Months) c. Long Term	a. Regular Data Collection b. Stakeholder and community feedback and surveys. c. Lessons Learned Session d. Performance Audit and Assessment	These measures will collectively result in an estimated 10-20% savings in project budget costs and timeline due to improved workforce management

	construction sites. c. Offer competitive salaries and benefits to attract and retain skilled workers. d. Foster a culture of respect, diversity, and inclusion within the workforce.	(18 + Months)	e. Regular Progress Reports and Review	and enhanced efficiency. This translates to approximately 500,000 to 1,000,000 pesos in budget savings and will potentially shorten the project duration by about 25 to 40 days.
Economic Factors / Issues	a. Develop detailed project budgets with contingency plans. b. Seek partnerships with financial institutions and investors. c. Regularly review and optimize project costs through value engineering. d. Stay informed about economic indicators and adjust project plans as needed.	a. Medium Term (6-18 Months) b. Long Term (18 + Months)	a. Regular progress reports and reviews. b. Adjustments to strategies based on monitoring results. c. Issue Tracking and Resolution Logs	These measures will collectively result in an estimated 10-20% savings in project budget costs and timeline due to improved financial management and economic foresight. This translates to approximately 500,000 to 1,000,000 pesos in budget savings and will potentially shorten the project duration by about 18 to 36 days.
Contractor Issues	a. Develop a prequalification process for contractor selection.	a. Medium Term (6-18 Months) b. Long Term	d. Regular Data Collection e. Stakeholder and community feedback and surveys.	These measures will collectively result in an estimated 10-20% savings in project budget

b. Use standardized contracts with transparent terms and conditions.	(18 + Months)	f. Lessons Learned Session	costs and timeline due to improved contractor management and performance. This translates to approximately 500,000 to 1,000,000 pesos in budget savings and potentially shortening the project duration by about 18 to 36 days
c. Conduct regular performance reviews and feedback sessions with contractors.		g. Performance Audit and Assessment	
d. Organize contractor meetings and workshops to discuss project goals and expectations.			

Discussion

A. Challenges and Issues on Vertical Construction

Based on existing literature, face-to-face interviews identified key on-site challenges in vertical construction. Communication issues were the most cited, with delays stemming from poor contractor involvement and lack of dedicated site staff (Participant 4), unclear scope communication (Participant 5), and generally weak communication skills (Participant 6). These issues lead to project delays and misaligned objectives. Literature supports the need for robust communication and strategic planning, with Parsamehr et al. (2023) advocating for digitization and BIM-based models to enhance collaboration, coordination, and management of schedule, cost, quality, and safety.

Project management was also highlighted, particularly late design modifications (Participant 2), inadequate contractor engagement (Participant 4), and coordination gaps (Participant 6), which contribute to cost overruns and delays. Kock et al. (2020) emphasize the role of Project Portfolio Management Information Systems (PPMIS), which enhance project outcomes when supported by formalized practices, regardless of project complexity.

Political interference emerged as another major challenge. Participants (7, 8, and 4) pointed to right-of-way issues, landowner objections, and bureaucratic delays as critical barriers. Strategic planning and stakeholder communication are essential to navigate these issues. Procore (2023) highlights how political, pandemic, and climate-related disruptions compound these challenges but also present opportunities for innovation through research, technology adoption, and resilience planning (Rankovic et al., 2024).

Workforce shortages were also a major concern, particularly the difficulty of recruiting skilled labor (Participant 2), health and safety issues (Participant 8), and the need for more personnel to improve design and planning flexibility (Participant 3). Moradi et al. (2020) recommend identifying key competencies in project managers—such as trust, stress tolerance, and decision-making—to strengthen collaborative teams and leadership in construction.

Economic challenges included rising material costs (Participant 1), delivery delays (Participant 7), and pandemic-related shortages (Participant 8), all of which affect budget feasibility and timelines. Cabarle and Cabarle (2023) recommend local sourcing, skills training, and innovative construction methods like modular building and 3D printing to reduce dependency on imports and improve sustainability.

Lastly, contractor-related challenges were underscored by Participant 5, citing difficulties in coordinating multiple contractors, maintaining quality, and managing contracts and disputes. Fuertes et al. (2020) emphasize the importance of strategic management and theoretical frameworks to improve contractor performance, accountability, and project outcomes in vertical infrastructure construction.

B. Action Measures and Approaches Employed by the Resident Engineers

Participant 2 emphasized the need for robust risk management, highlighting early risk identification and mitigation to control costs, ensure timely delivery, and enhance safety. Effective risk management strengthens resource optimization and stakeholder confidence. Participant 1 stressed program and specification oversight, with strict adherence ensuring quality, consistency, and compliance. This aligns with legal codes like the NSCP and NBCP and supports improved training for engineers and architects. Effective workforce management, highlighted by Participants 3 and 6, includes adapting to shortages, focused labor deployment, and engaging field operations to streamline processes. Methods such as top-down sequencing enhance productivity and reduce rework. Participants 4, 6, and 8 stressed Communication and documentation, particularly transparent meetings, stakeholder engagement, and collaboration with consultants. BIM platforms facilitate this through shared 3D models, enabling real-time updates, efficient decision-making, and enhanced coordination.

Strategic planning and goal setting—supported by Participants 2 and 4—enable proactive scheduling, risk management, and stakeholder alignment. Tools like SMART goals and the Logframe model help define objectives and improve evaluation. Health and safety, emphasized by Participants 7 and 8, are vital for productivity and compliance. CSHP and COSH frameworks mandate protocols, health screenings, and hazard controls to reduce disruptions and ensure worker well-being. Participant 2 also highlighted flexible scheduling to address material shortages, price volatility, and weather disruptions. Techniques like PERT and LOB manage project uncertainty and repetitive workflows, while health-focused flexibility boosts morale and efficiency.

Cost analysis and preventive planning, cited by Participants 1 and 6, ensure financial control and risk mitigation. Techniques like FIFO and LIFO inform inventory costing, while canvassing prices from suppliers optimizes budgeting. Participant 4 stressed that frequent inspections and efficient site operations enhance quality, schedule adherence, and stakeholder trust. Key metrics include cycle time, cost variance, and safety performance. Scheduled punch-listing, as discussed in Lederle (2021), ensures defect resolution, accountability, and smoother closeouts, with rolling lists improving real-time problem-solving.

Participants 5 and 8 advocated for Integrated Project Delivery (IPD) and feedback mechanisms to align stakeholder goals, minimize conflict, and drive continuous improvement. Public-Private Partnerships (PPP) support financing, risk-sharing, and lifecycle management. Accurate scope identification and detailed estimates, highlighted by Participant 1, clarify project boundaries, optimize resources, and reduce execution uncertainties. Techniques like parametric estimating use historical data for early-stage cost forecasting.

Future trends identified by Participants 4 and 8 include digital tools like MS Project and Buildertrend, modular construction, and 3D printing robots. These technologies reduce costs, accelerate timelines, and improve sustainability. Companies like Bahay Makabayan and Revolution Pre-crafted lead in prefabrication in the Philippines. Automation in welding and assembly improves consistency and safety. Geotechnical investigations provide critical data for foundation stability and earthquake resilience. Participants 5 and 6 emphasized resilient and sustainable design, including braced frames and dampers, to withstand natural disasters. Green building practices, promoted by PHILGBC and BERDE, support energy efficiency, waste reduction, and compliance with government sustainability policies. These practices reduce operational costs, create jobs, and enhance project viability and resilience.

C. Proposed Strategic Plan and Project Management

To address the persistent challenges faced by resident engineers in vertical construction projects in the Philippines, a strategic plan targeting six key areas—communication, project management, political intervention, workforce development, economic factors, and contractor management—is essential. Communication issues can be resolved through project management tools (e.g., Asana, Trello, MS Project), clear protocols, regular meetings, centralized digital documentation, and communication training. For project management, adopting PMBOK, Agile, and Lean Construction methods, using Gantt charts and CPM, conducting risk assessments, tracking KPIs, and ensuring continuous professional development will enhance performance. Political disruptions can be mitigated through strong government relations, advocacy for regulatory clarity, and a dedicated liaison team. Workforce challenges require partnerships with educational institutions, safety enforcement, competitive compensation, and inclusive culture initiatives.

Economic instability can be managed with robust financial planning, diversified funding, value engineering, and trend analysis. Contractor performance can be improved through transparent selection, standardized contracts, regular evaluations, and collaborative

meetings. The plan will be implemented in phases: short-term (0–6 months) focuses on communication, workforce training, government engagement, and financial planning; medium-term (6–18 months) addresses full deployment of management systems, risk mitigation, and workforce initiatives; long-term (18+ months) ensures continuous improvement and economic adaptability. Execution depends on collaboration among resident engineers and key departments (HR, Finance, Procurement, QA, and Maintenance), with project performance tracked via KPIs evaluating communication, scheduling, political impact, workforce stability, budget adherence, and contractor effectiveness through reports, audits, surveys, and strategic reviews. This framework equips engineers to manage complex construction projects efficiently, ensuring regulatory compliance and long-term project sustainability.

Conclusion and Recommendation

A. Conclusion

In conclusion, the study identifies communication breakdowns, weak project management, political disruptions, workforce limitations, economic instability, and contractor coordination issues as key impediments to effective vertical construction. These challenges are not isolated operational lapses but indicators of deeper systemic and structural inefficiencies within the current project delivery environment, as revealed through the narrative and thematic analysis of Resident Engineer's lived experiences. Addressing such interconnected issues requires an integrated strategic approach that strengthens risk management, enforces strict specification oversight, enhances human resource development, reinforces safety protocols, and promotes more deliberate and transparent stakeholder engagement. The strategic model developed in this study presents a holistic, practice-based framework that connects root challenges to actionable strategies, milestones, and implementation pathways—supported by enhanced communication systems, flexible scheduling, cost control measures, weather mitigation, and preventive management practices. Regular site inspections, architect–engineer coordination, and workflow optimization further reinforce quality and safety, while the integration of emerging technologies and sustainable methods supports long-term resilience in vertical construction.

Critically, this study contributes to the field of Civil Engineering and Construction Management by translating field realities into structured, strategic solutions. First, it bridges the gap between policy and on-site implementation by capturing tacit knowledge often overlooked in formal project management guidelines, thereby offering more realistic and context-sensitive strategies for DPWH and private sector practitioners. Second, the study strengthens construction management practice by introducing a systems-oriented model that integrates workforce capability, risk mitigation, communication protocols, contractor performance, and technology adoption—key competencies expected of modern civil engineers and project managers. Finally, by proposing measurable, time-phased interventions

capable of reducing project delays and costs, the study enhances decision-making, supports capacity-building, and promotes more resilient and efficient project delivery.

B. Recommendation

1. **Communication Issues:** Implementing project management software like Asana, Trello, or Microsoft Project can streamline communication and cooperation. Biweekly project update meetings with stakeholders ensure consistent progress and quick issue resolution. A common digital repository for documents enhances transparency and access to essential data. Quarterly communication workshops improve team communication skills, fostering a more productive environment.
2. **Project Management Issues:** Training teams in Agile and Lean construction principles enhances flexibility and efficiency. Tools like CPM and Gantt charts ensure proper scheduling. Regular risk assessments and updated risk registers help mitigate potential issues, while KPIs continuously monitor project performance. Annual training and certifications keep the team's knowledge current, improving project execution.
3. **Political Intervention/Factors:** Establishing a dedicated government relations team to handle political interactions is recommended. Engaging in industry associations and regular meetings with officials helps influence decisions and address challenges. A contingency plan for political risks ensures preparedness and resilience, supporting project stability.
4. **Workforce Issues:** Collaborating with technical institutions for specialized training ensures a skilled workforce. Frequent safety training and audits ensure compliance and worker safety. Competitive pay and benefits attract and retain talent, while fostering an inclusive culture improves teamwork and job satisfaction, supporting project success.
5. **Economic Factors:** Developing detailed project budgets with contingencies addresses financial risks. Partnerships with investors and financial institutions provide additional support. Value engineering optimizes costs, and staying informed on economic trends allows for proactive adjustments to project plans, ensuring financial stability.
6. **Contractor Issues:** A prequalification process ensures reliable contractors. Standardized contracts with clear terms minimize disputes. Regular performance evaluations and contractor meetings promote accountability and collaboration, aligning goals and enhancing project success.

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